REMARKS

Applicant hereby submits this Response and Amendment to the Office Action mail dated October 19, 2007.

Claims 1 - 13, 16 and 21 - 24 have been examined. The Examiner withdrew from consideration claims 14, 15, and 17 – 20 as being drawn to a non-elected invention.

With respect to the Election/Restriction requirement and the withdrawal of claims 14, 15, and 17-20, Applicant thanks the Examiner for including more than Group I in the examined claims. However, Applicant respectfully requests that the Examiner reconsider the withdrawal of claims 14, 15, and 17-20, and asks the Examiner to include them in the next examination. Applicant still believes that all of claims 1-24 are directed to the same invention and that the Examiner must necessarily search all the same art areas in examining any and all of the claims in this patent application. In fact, Applicant notes that the references cited and applied are classified in U.S. classifications 60/ 274, 60/276, 60/278, 123/674, 364/431.x, 60/275, 60/285, 123/692, 123/673, and123/672. many of which were discussed earlier as being related to claims 14 and 15 (previous Office Action the Examiner noted that class 123, subclass 673 and class 123, subclass 679 would need to be searched) and claims 17-20 (previous Office Action these claims were determined by the Examiner to be classified in class 123, subclass 679). Therefore, even the Examiner's own identified an applied references indicate that these classes and subclasses must be search for all claims, and there is no additional burden on the Examiner to examine all of claims 1-24 together.

Applicant also submits that the present amendments help to further direct all claims more clearly to the same invention. Applicant requests once again that the Examiner reconsider and

examine all the claims together now. Applicant hopes that the Examiner will seriously consider including Claims 19 and 20 in the substantive examination because Applicant believes that the various amendments made over time to these claims resulted in all claims are directed to the same invention, and they should all be examined together.

The Examiner rejected claims 1-8, 10-13, 16, and 21-24 under 35 USC 102(b) as being anticipated by Akazaki et al. (U.S. Pat. No. 5,566,071). This rejection is respectfully traversed. Claims 1, 4 - 7, 11 - 14, 16 -19, 23 and 24 have been amended to more clearly claim the invention of the present patent application. For the following reasons, Applicant respectfully submits that Akazaki et al. does not anticipate claims 1-8, 10-13, 16, and 21-24 for at least the reason that it fails to disclose, teach or suggest each and every limitation of the claims.

I thank the Examiner for speaking with me on the telephone earlier today, and agreeing that a linear air/fuel oxygen sensor (LAF) and a switching oxygen sensor (SOS) are two distinctly different types of oxygen sensors. Based on this understanding and Applicants present amendments, Akazaki et al. can not and does not anticipate claims 1-8, 10-13, 16, and 21-24 for at least the reason (as amended herein) for at least the reasons that Akazaki et al. discloses an LAF, and does not disclose an SOS.

As a general matter, Applicant notes that Akazaki et al. (and Maki et al.) does not disclose, teach or suggest using a switching oxygen sensor. Rather, Akazaki et al. (and Maki et al.) disclose an air/fuel ratio estimation system using a linear air/fuel oxygen sensor (LAF). Applicant has by this amendment amended the claims so that each independent claim in the present patent application includes the use of a switching oxygen sensor (SOS). As such, for at

least this reason, the Akazaki et al. (and Maki et al.) reference does not and can not anticipate any of the claims (as amended) in the present patent application.

Various embodiments of the present invention are directed in part a methods of engine fuel control, cycling of an oxygen sensors output, or identifying an oxygen sensor response time, that utilizes a switching oxygen sensor (SOS) and is performed in a unique manner. Individual cylinder control in the present application is primarily based upon using, in various embodiments, a low cost switching oxygen sensor (SOS) that provides only a high-low output voltage depending upon exhaust oxygen concentrations associated with richer or leaner than stoichiomtric conditions. In other words, an SOS results in either an on-state or an off-state based on a threshold of oxygen concentration in the engine exhaust. On the other hand, an LAF has an output voltage that varies linearly with the oxygen concentration in the exhaust. These functions are fundamentally different, and the use of an LAF is different than the use of a SOS in various engine control system functions. Further, one skilled in the art is aware such a SOS presently have a significantly faster response time than the slower responding linear air/fuel (LAF) type oxygen sensor that provides an output voltage proportional to the oxygen concentration of the exhaust gas over a wide range of air-fuel ratios. Use of the slower responding LAF oxygen sensor by the Applicant would reduce the response gain of the engine fuel control system during transient load changes (compare with, for example, Akazaki at Col.7, lines 25-30).

In synopsis, the claimed invention provides in part a method of controlling an individual cylinder's exhaust gases' varied gas contents, such as carbon monoxide (CO) and oxygen, to allow for both simultaneous heating and diagnosis of the catalytic converter. Diagnosis of the

catalyst in the application is based upon measuring various temperatures versus time characteristics using a catalytic converter temperature sensor together with other engine control parameters. As catalyst diagnosis is integrated with catalyst heating, both during engine cold start and during more steady state conditions, there is a critical need to control all factors significantly influencing catalyst temperature changes that are known to one skilled in the art. This is to assure accurate and repeatable detection of catalyst conditions during both heating and diagnosis. Paragraphs 23-24 of the present patent application specification discloses these methods and the control of defined changes in the exhaust gases' energy level entering the catalyst. Paragraphs 4-5 of the present patent application specification discusses the reasons for closely integrating the catalytic converter diagnosis and heating methods.

Paragraphs 77-79 of the present application specification discloses methods and reasons for modifying engine control during transient load changes to reduce the resulting air/fuel perturbations that can affect the disclosed methods of catalyst diagnosis and heating, especially following cold engine start. While Paragraphs 116 and 123 disclose the necessity of synchronization of a switching oxygen sensor's high-low output voltage sampling for determining the timing of individual cylinder exhaust valve opening and sensor response time detection while Paragraphs 113-114 disclose parts of the methods.

On the other hand, Akazaki 5566017 provides a method of controlling individual cylinder A/F ratio at low engine speeds such as idle (see Akazaki at Col 10, lines 27-35) using a Linear Air-Fuel (LAF) sensor. Such LAF sensor is also known as Wide-range airfuel ratio sensor 40 and is primarily an oxygen concentration detector (see Akazaki at Col. 2, lines 56-67, Col. 3, lines 1-10). As Akazaki further clarifies this LAF sensor "is not an oxygen sensor which

produces an inverted output only in the vicinity of stoichiometric air/fuel ratio" (see Akazaki at Col. 1, lines 28-30). This discussion in Akazaki correlates directly with the description of a switching type oxygen sensor provide in the present patent application, clearly indicating the distinction between the two types of oxygen sensors. So as disclosed by Akazaki, this LAF sensor used therein is not a switching oxygen sensor as is specifically disclosed and claimed in the present patent application.

Further, the LAF sensor, used in the upstream location by both Akazaki (and Maki), would therefore significantly slow the speed of the engine controller in correcting such air/fuel perturbations from stoichiometric conditions during transient load changes if it were used in the Applicant's described control method, that is dependant on its catalyst diagnosis' heating method. Paragraphs 40, 111-113 and 123 of the Specification explains these significant differences, both between a SOS and LAF sensors while disclosing why a switching type oxygen sensor (SOS) is used for rapid fuel control corrections made during certain transient load changes as well as SOS sampling synchronization to exhaust valve opening.

Previously presented Claim 3 clearly specified the use primarily of a SOS as disclosed in Paragraphs 142-143 of the Specification. Therefore, the Examiner was mistaken in his rejection of claim 3 (and similar claims) and use of the LAF sensor 40 disclosed in Akazaki. By the present amendments, all the independent claims of the present patent application now include the use of an SOS. Therefore, Applicant respectfully submits that for at least this reason, claims 1-8, 10-13, 16, and 21-24 are not anticipated by Akazaki et al. under 35 USC 102(b).

The Examiner rejected claim 9 under 35 USC 103(a) as being unpatentable over Akazaki et al. as applied to claim 7, in view of Maki et al. (U.S. Pat. No. 5,758,490). This rejection is

respectfully traversed. As noted above, claims 1, 4 - 7, 11 - 14, 16 -19, 23 and 24 have been amended to more clearly claim the invention of the present patent application, by amending the claims to include a switching oxygen sensor (or corresponding and supporting such recitation thereto). For the following reasons, Applicant respectfully submits that neither Akazaki et al. nor Makai et al. render claim 9 obvious, either individually or in combination.

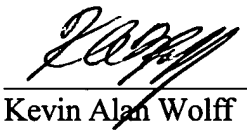
Claim 9 is dependent on claim 7, and claim 7 has been amended to include a switching oxygen sensor. As noted above, neither Akazaki et al. nor Makai et al. disclose, teach or suggest using a switching oxygen sensor. As admitted by the Examiner at page 6 of the Office Action, Makai et al., like Akazaki, discloses us of an upstream LAF sensor 54, and a downstream oxygen sensor 56. In fact, Makai et al. only discusses a LAF oxygen sensor and does not mention a switching oxygen sensor. (See Makai et al. at, for example, col. 7, lines 11-24.) Therefore, Makai et al. fails to make up the deficiencies of Akazaki et al., and can not render claim 9 (dependent on claim 7) obviousness. Therefore, claim 9 is patentable over Akazaki et al. in view of Makai et al. for at least the reason that it fails to disclose, teach or suggest a switching oxygen sensor as claimed in the present patent application.

Based on the aforementioned, Applicant respectfully submits that claims 1-24 are in condition for allowance as patentable over the cited and applied references. Applicant respectfully request that claims 1-24, or at least claims 1 - 13, 16 and 21 – 24, be allowed and passed to issue as soon as possible. **If far any reason the Examiner disagrees, Applicant asks that the Examiner contact the undersigned to set a time for an Examiner Interview to quickly place the claims in condition for allowance.**

Applicant hereby petitions for any extension of time which may be required to maintain the pendency of this case, and any required fee, except for the Issue Fee, for such extension is to be charged to the charge card identified in the previously submitted credit card form.

If for any reason the Examiner believes that the present application is not now in condition for allowance, the Examiner is requested to contact the undersigned at the telephone number listed below or on my mobile telephone at 703-731-7220.

Respectfully submitted,



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